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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/922,936	08/07/2001	Raj N. Master	52352-483	9521

7590 11/18/2002

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EXAMINER	
PITTMAN, ZIDIA T	

ART UNIT	PAPER NUMBER
1725	12

DATE MAILED: 11/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/922,936	MASTER ET AL.	
	Examiner	Art Unit	
	Zidia Pittman	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 September 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *18 and 22-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *18 and 22-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *09 September 2002* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *9* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on September 9, 2002, has been approved by the examiner. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 18 and 22-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Master et al (WO 99/48141) in view of Stoops (USPN 5,615,828).

Master et al teaches an automated brush fluxing system for application of controlled amount of flux to packages. Figure 3B is a side view of the four substrate structures and the carrier. A flux application structure is shown. A CPU (central processing unit) controls the mechanical stage and the amount of flux that is dispensed via a valve from the flux reservoir. The mechanical stage has a brush structurally attached thereto and moves the brush in the x, y, and z directions. The flux is dispensed by a valve controlled by the CPU into a tube and then into the brush or can be dispensed onto the brush or directly onto the substrate. The CPU controls the movement of the brush via the mechanical stage and the amount of flux that is dispensed from the flux reservoir by a program that is empirically determined for the specific substrate and chip that are being assembled. The empirically generated program determines the pattern of the brush strokes that is required to achieve a uniform layer of flux to the regions and the amount of flux that is required to be dispensed onto the surface to achieve the uniform layer of flux. A semiconductor chip is shown in position to be placed on the substrate.

The empirically generated program determines the initial downward distance that the brush travels toward the surface of the substrate, determines the distance that the brush backs off of the surface of the substrate and determines the force that needs to be applied to the brush to hold it at the desired distance from the surface of the substrate. The empirically generated program can be determined using one of a number of available fluxes that are generally available commercially. The two major criteria used to determine the empirically generated program is uniformity of the flux coverage, thickness and the optimization of the throughput of the process. Different programs can be determined for different fluxes.

The flux is generally characterized by a viscosity and therefore any flux within the viscosity range of the flux that is used to determine the empirically generated program can be used for future applications for the specific substrate/chip combination being assembled. A major advantage of having a program for each substrate/chip combination/flux is that the assembly system can be quickly changed from one substrate/chip/flux combination to another substrate/chip/flux combination. (page 10 line15 – page 12 line 12)

Master et al does not teach an apparatus for dispensing flux including a flux dispense nozzle configured for spraying flux at a valve pressure between about 1.5 psi and about 30 psi to deposit the flux on the plurality of conductive terminals, wherein flux nozzle is a flux needle having an needle opening having a diameter range between 5 microns and about 60 microns.

Stoops discloses an apparatus for applying flux. The flux is contained in a precisely pressurized reservoir and passes through a filter, tubing, and fitting to be distributed through main manifold. A flow sensor monitors the flow rate. The reservoir can also have a piston which is above the flux and prevents air entrapment in the flux. The flux is then distributed to each high-speed valve or regulator through a fitting mounted on the main manifold. Each valve or regulator is then actuated at a specified pulse rate to distribute flux to an individual tip or to a tip manifold assembly. The controls define the pulsed streams or tip manifold which will be activated for the particular board width. Sensor can also be used if an end-of-dispense signal is desired before sensor is deactivated as may occur if the board is palletized. The pulsed flux application can be controlled to be applied, or not applied, at any location on the board as the board travels past the pulsed application. Through the use of low solids flux, and pulsing at a range of on-times of one to forty milliseconds and off-times of three to two hundred milliseconds, a very thin layer of flux is applied to the selected surface of the board. For example, tests have suggested application of a coating of flux in the amount of 0.0012 g/in^2 with a pressurized fluid at five psi and a pulse ratio of fifteen milliseconds on-time and one hundred milliseconds of off-time. An operational control provides for easy operator interface and for control of the mode (SETUP, MANUAL or AUTO), width selection, pressure selection, and pulse rate selection. The operating interface also displays the actual values for fluid pressure, fluid flow, reservoir level, active tip manifold segments, and system safety or error conditions. Of course still other parameters or

conditions can be added to the control as desired. (abstract; Figures 4, 6, and 7; column 5 line 50 – column 6 line 19; column 6 lines 51-58)

Stoops also teaches the tip has a precision orifice in the range of 0.003" to 0.010" diameter. (column 7 lines 16-21)

In the absence of superior or unexpected results, the tip of Stoops would read on the needle of the instantly claimed invention.

With respect to the limitations requiring a data processing device adapted for determining an optimum valve pressure, flux viscosity, and flux spray pattern based on a configuration of the substrate and an arrangement pattern of conductive terminals, a flux dispense nozzle configured for spraying flux at a valve pressure range between about 1.5 psi and about 30 psi to deposit the flux on the plurality of conductive terminals, the data processing device controls movement of the flux dispense nozzle in at least two dimensions relative to the substrate, wherein the data processing device decides a plurality of subsets based on the configuration of the substrate and the arrangement pattern of conductive terminals thereon, each subset comprising a plurality of conductive terminals closely located to each other, and the data processing device controls the apparatus to selectively spray the flux on each subset sequentially, the examiner submits that these limitations do not further limit the structural aspects of the invention. Furthermore, the reference need only teach the structural limitations of the apparatus with those structural limitations capable of performing the functions indicated. The combination of Master et al and Stoops teaches the structural limitations required by the claims as indicated above.

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the teachings of Master et al with the teachings of Stoops in order that a fine, thin jet of flux is obtained for effectively coating/filling the substrate. (see column 7 lines 19-21)

Claims 18, 22-24, and 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Master et al (WO 99/48141) in view of Napor (USPN 3,741,150).

Master et al teaches an automated brush fluxing system for application of controlled amount of flux to packages. Figure 3B is a side view of the for substrate structures and the carrier. A flux application structure is shown. A CPU (central processing unit) controls the mechanical stage and the amount of flux that is dispensed via a valve from the flux reservoir. The mechanical stage has a brush structurally attached thereto and moves the brush in the x, y, and z directions. The flux is dispensed by a valve controlled by the CPU into a tube and then into the brush or can be dispensed onto the brush or directly onto the substrate. The CPU controls the movement of the brush via the mechanical stage and the amount of flux that is dispensed from the flux reservoir by a program that is empirically determined for the specific substrate and chip that are being assembled. The empirically generated program determines the pattern of the brush strokes that is required to achieve a uniform layer of flux to the regions and the amount of flux that is required to be dispensed onto the surface to achieve the uniform layer of flux. A semiconductor chip is shown in position to be placed on the substrate.

The empirically generated program determines the initial downward distance that the brush travels toward the surface of the substrate, determines the distance that the brush backs off of the surface of the substrate and determines the force that needs to be applied to the brush to hold it at the desired distance from the surface of the substrate. The empirically generated program can be determined using one of a number of available fluxes that are generally available commercially. The two major criteria used to determine the empirically generated program is uniformity of the flux coverage, thickness and the optimization of the throughput of the process. Different programs can be determined for different fluxes.

The flux is generally characterized by a viscosity and therefore any flux within the viscosity range of the flux that is used to determine the empirically generated program can be used for future applications for the specific substrate/chip combination being assembled. A major advantage of having a program for each substrate/chip combination/flux is that the assembly system can be quickly changed from one substrate/chip/flux combination to another substrate/chip/flux combination. (page 10 line15 – page 12 line 12)

Master et al does not teach an apparatus for dispensing flux including a flux dispense nozzle configured for spraying flux at a valve pressure between about 1.5 psi and about 30 psi to deposit the flux on the plurality of conductive terminals, wherein flux nozzle is a flux needle having an needle opening having a diameter range between 5 microns and about 60 microns.

Napor et al teaches an automatic flux spray dispenser. In order to maintain a constant supply of flux at a uniform viscosity and pressure at the nozzle, a preferred flux reservoir and supply system are incorporated. The system includes automatic nozzle controls and a flux supply system for the nozzle. The preferred reservoir in the present system comprises the generally vertical pipe-like reservoir having its lower end coupled to the circulating pump. In order to maintain the flux at a uniform viscosity and with a homogenous mixture, a portion of the flux is continuously circulated through the hose connecting the pump outlet and the open upper end of the flux reservoir. A preferred form of pump is capable of circulating the liquid flux with a relatively constant pump pressure output and which resists wear or corrosion from typical corrosive and abrasive flux materials. (abstract; Figures 2 and 7; column 2 line 24 – column 3 line 20; column 3 lines 47-61)

With respect to the limitations requiring a data processing device adapted for determining an optimum valve pressure, flux viscosity, and flux spray pattern based on a configuration of the substrate and an arrangement pattern of conductive terminals, a flux dispense nozzle configured for spraying flux at a valve pressure range between about 1.5 psi and about 30 psi to deposit the flux on the plurality of conductive terminals, the data processing device controls movement of the flux dispense nozzle in at least two dimensions relative to the substrate, wherein the data processing device decides a plurality of subsets based on the configuration of the substrate and the arrangement pattern of conductive terminals thereon, each subset comprising a plurality of conductive terminals closely located to each other, and the data processing device

controls the apparatus to selectively spray the flux on each subset sequentially, the examiner submits that these limitations do not further limit the structural aspects of the invention. Furthermore, the reference need only teach the structural limitations of the apparatus with those structural limitations capable of performing the functions indicated. The combination of Master et al and Napor teaches the structural limitations required by the claims as indicated above.

At the time of the invention, it would have been obvious to modify the teachings of Master et al with the teachings of Napor et al in order to directly apply flux to the necessary areas of the articles and to conserve flux by providing precisely controlled and positioned flux patterns. (see column 1 lines 34-37)

Response to Arguments

Applicant's arguments with respect to claims 18 and 22-30 have been considered but are moot in view of the new ground(s) of rejection.

In response to applicant's arguments that neither Stoops nor Napor teaches the limitations of the data processing device adapted for determining an optimum valve pressure, flux viscosity, and flux spray pattern based on a configuration of the substrate and an arrangement pattern of conductive terminals on the substrate, and the data processing device controls movement of a flux dispense nozzle in at least two dimensions relative to the substrate, the examiner submits the newly cited reference as stated above teaches the stated limitations.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Brownfield et al (USPN 6,399,902), Watanabe et al (USPN 6,164,516), Master et al (USPN 6,098,867), Smith et al (USPN 5,747,102), Sadler et al (USPN 5,560,537), Stoops et al (USPN 5,328,085), Konno (USPN 5,266,113), Peana et al (USPN 5,074,455), Sumiyoshi (USPN 4,934,307), and Park et al (USPN 4,848,641) are cited as of interest.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zidia Pittman whose telephone number is (703) 305-

1248. The examiner can normally be reached on Monday – Thursday and alternate Fridays from 8:30 am to 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn, can be reached at (703) 308-3318. The official fax phone number for the organization where this application or proceeding is assigned is (703) 305-7718. The unofficial fax number for art unit 1725 is (703) 305-6078.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

TP
11/13/02

TOM DUNN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700